

# Pump Integrated Memory - PIM 01

## Installation and user manual



This manual is applicable to the following versions:

Hardware: PIM 01 (part no. 40-501551 and 40-501586)  
Software: PIM firmware v.1.14 (63 A, part no. 40-501551), v 2.00 (200 A, part no. 40-501586).  
PC program v.1.1 - "PIM Assistant"©

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## 1. Introduction

The Flygt Pump Integrated Memory (PIM) is a small device for logging runtime, number of starts, pump current and temperature inside the pump top. It also stores administrative data such as data plate information, customer information, application information and service history. PIM data is administrated by means of a PC program: "PIM Assistant".

### 1.1. Product Documentation

Documentation delivered with PIM 01. Please check that this manual version is applicable to the delivered hardware and software versions (see cover inlet).



### 1.2. Safety Regulations for Owner/Operator

- All government regulations, local health and safety codes shall be complied with.
- All danger due to electricity must be avoided.

### 1.3. Guarantee

- Modifications or changes to the unit/installation should only be carried out after consulting with Xylem Inc.
- Original spare parts and accessories authorized by the manufacturer are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation.

### 1.4. Symbols Used

	<b>Safety instruction</b> Personal safety - dangerous voltage
	<b>Special attention value</b> Apparatus or component damage

## PIM installation instructions

## 2. PIM installation instruction

### 2.1. Software installation

Install the program "PIM Assistant" by running the file "PIM\_Assistant\_Setup.exe" available from the Xylem Inc. Intranet. Follow the on-screen instructions. USB drivers are automatically installed.

"PIM Assistant" will run under Windows XP or Windows Vista, with JAVA installed.

JAVA must already be installed on the computer in order for "PIM Assistant" to install and run. Download and install JAVA from [www.java.com](http://www.java.com).

See also: chapter 4.3. "Connecting a PIM to the PC".

### 2.2. Hardware installation and safety



*Electrical wiring must be carried out only by a qualified electrician and in accordance with local regulations.*

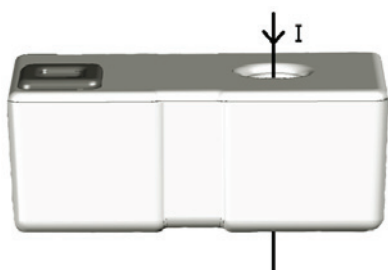
*Always disconnect the pump power supply before proceeding to carry out installation or service on the PIM unit inside the pump. Isolate the power supply before opening the pump.*

*Ignoring these precautions may lead to severe injury or death!*



*The PIM unit must be secured (e.g. with a strap) to eliminate the risk of the phase lead coming loose due to shakes or vibrations. To prevent damage to the phase lead isolation, make sure that the phase lead is not squeezed between the PIM unit and adjacent, sharp edged surfaces.*

Hardware installation of the PIM unit is done by running one of the phase leads one or several laps through the opening in the PIM unit (see picture below) and strapping the PIM tightly to a suitable fixed point inside the pump top.

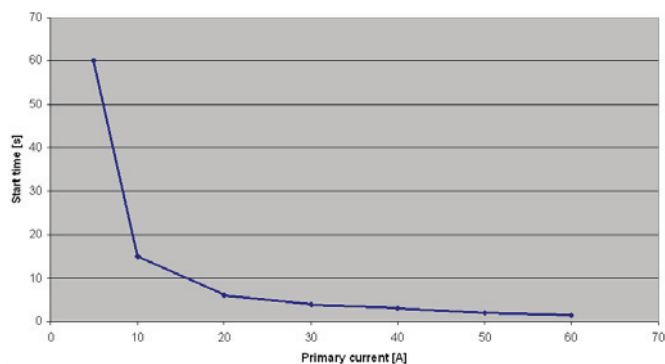


PIM unit with a phase lead running through it once.

PIM gets its power from the same transformer that is also used for measuring the current. PIM is rated for 6-63 A<sub>ac</sub> (part no 40-501551) or 60-200 A<sub>ac</sub> (part no 40-501586). The primary current must be maintained above 6/60 A at all times. Note that this is true also if the pump is starting and running without any load.

Consequently **the primary current should preferably stay between 40 and 60 A<sub>ac</sub> (part no 40-501551) or 120-200 A<sub>ac</sub> (part no 40-501586) at full load** and the closer to 60/200 A the better.

There is a delay at start-up before PIM begins to log data. The delay varies with the magnitude of the primary current, as shown for the 63 A PIM in the graph below. The same principle applies for the 200 A PIM. This means that **if the total primary current is low, very short running cycles may not be logged.**



Start-up time for a 63 A PIM depending on the total primary current.

The total primary current through the transformer can be regulated simply by running the phase lead several laps through the opening. The number of phase lead runs must also be entered in the PIM software in order to get the scaling correct. The following two tables give the proposed number of phase lead runs through PIM depending on the pump's rated current. Deviations from the tables may be required depending on physical limitations to fitting the cable the proposed number of runs through the PIM.

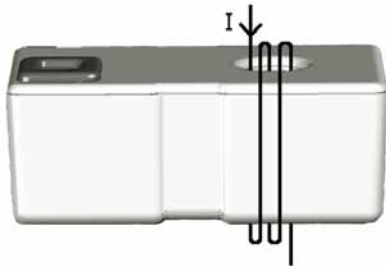
## PIM installation instructions

**Table 1 PIM 6–63 A (part no 40-501551)**

Rated current	# Phase lead runs	Total current
6 A	7	42 A
7 A	6	42 A
8-9 A	5	40-45 A
10-15 A	4	40-60 A
16-20 A	3	48-60 A
21-30 A	2	42-60 A
30-63 A	1	30-63 A

Proposed number of phase lead runs through 63 A PIM depending on the rated pump current; Resulting total current.

*Example: If the pump is rated 17.5 A the phase lead should be run 3 laps through the PIM unit, giving a total current of  $17.5 \times 3 = 52.5$  A.*



PIM unit with 3 phase lead runs.

Note! When a PIM unit is connected to a PC via USB cable, it will automatically enter “communication mode”, during which it is prevented from logging any data.

**Table 2 PIM 60–200 A (part no 40-501586)**

Rated current	# Phase lead runs	Total current
60-64 A	3	180-195 A
65-99 A	2	130-198 A
100-200 A	1	100-200 A

Proposed number of phase lead runs through 200 A PIM depending on the rated pump current; Resulting total current.

## Data logging in PIM

### 3. Data logging in PIM

PIM contains a 4 MB flash memory for storing pump information and logging data. The pump information includes the following:

- Data plate
- Customer information
- Application information
- Service log
- Alarm log
- Total runtime and number of starts

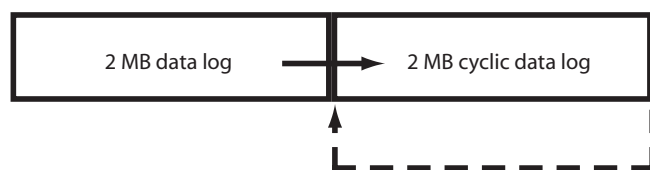
The following parameters are logged together with a timestamp from a built-in, battery supported real-time clock:

Parameter	Logging interval
Pump current	Every 10th second
Current variation	Every 10th second
Temperature in PIM (junction box)*	Every minute
*Note that since the temperature is measured inside the PIM unit this only gives a general indication of the pump temperature.	

Because a timestamp is also stored at each pump start, frequent starting and stopping results in a significantly increased demand on the log memory.

Because of the potential risk of losing operational data, PIM also continuously logs the total running time and number of starts.

Almost all of the 4 MB memory is reserved for data logging. The memory is divided into two equal parts, as shown in the following picture.



PIM data log memory allocation.

The first 2 MB partition is used for storing data, beginning when the pump is first commissioned and ending when this memory partition is completely filled up.

The second 2 MB partition is then employed as a cyclic memory, which means that if any data is lost due to extended run time, this will be data from the middle of the running period.

The reasoning behind this memory disposition is that it shall be possible to follow trends, for example in the pump current, from when the pump was commissioned and to make comparisons after some months of wear.

Data logging occurs only while the pump runs. When the pump is idle, no data is registered in the PIM unit.

## PIM Assistant (PC program)

# 4. PIM Assistant (PC program)

## 4.1. Starting the program

Start “PIM Assistant” by clicking Start – All programs – PIM Assistant – PIM Assistant.

## 4.2. Initial program setup

The first time the program is run, you will be prompted to make a basic program configuration.

This consists of three dialogs:

- Workshop Setup
- Service Setup
- Preferences

The settings can be changed later under the Setup menu.

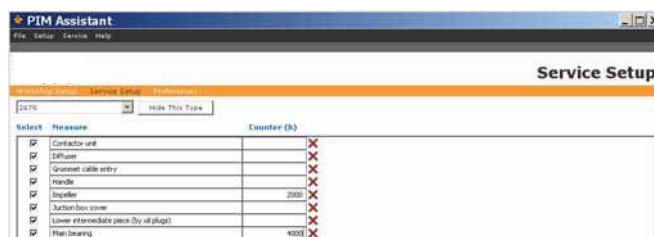
### 4.2.1. Workshop Setup

Enter the names of the service workshop and the service personnel. This is an aid for faster service reporting. Click Next when ready.

### 4.2.2. General Service Setup (not connected to PIM)

The Service Setup is used for creating general templates that will facilitate and optimize service at the workshop. The setup enables:

- Selection of those pump models serviced at a particular workshop.
- Addition of pumps or machines not already present in the drop-down list.
- Addition or removal of items in the list of measures specific for each pump type.
- Association of time counters for essential pump parts, to optimize service intervals.



(General) Service Setup dialog

The service measures entered here will be proposed as default when setting up a new PIM unit. Click **Next** when ready.

## 4.2.3. Preferences

### General

**Password activated:** if checked, a password will have to be entered when setting up a new PIM. The password will then have to be entered in order to read from the PIM.

**Date format:** Select a date format.

**Auto save:** If checked, “PIM Assistant” will automatically save the files down loaded from a connected PIM.

**Save Path:** Enter a directory in which the PIM data files will be saved. Default is the subdirectory ‘PIMs’.

### Quick Overview Defaults

Select this if the full data plate, the diagram and the alarm log shall be visible on the Quick overview page as default.

If the full data plate is not chosen, only the mandatory fields will be displayed (Serial number, Product number, Voltage, Current and Input power).

### Diagram Default

Enter default settings for graph axis values. “% of Current” is given as a percentage of the nominal current entered in the data plate information.

### Alarm Level Defaults

Enter default alarm limits. These are by default set to 85% and 110% of the rated current for low/high current and to 85 °C (185 °F) for the temperature.

If the alarm level settings for the PIM need to be changed at a later stage, the alarm limits will be entered in Amperes instead of as a percentage of the rated current.



Preferences dialog

Click **Save** when you are satisfied with the settings. These can all be edited later under the **Setup** menu.



## PIM Assistant (PC program)

### 4.3. Connecting a PIM to the PC

Install the software (“PIM Assistant”) before connecting a PIM unit for the first time! This ensures that the USB drivers are in place before connecting any hardware.

Connect a USB cable between the PIM and your computer. The PIM connects to a type B connector, so you will typically need a type A to type B cable.



USB connectors of the types A and B

“PIM Assistant” will automatically detect the connected PIM unit. When a PIM is connected to a PC with “PIM Assistant” the PIM internal clock will be automatically synchronized to the computer clock.

The first time a PIM is connected to the computer, Windows will detect it and install software.

USB drivers are automatically installed with the “PIM Assistant” software. When prompted for the “USB Serial converter”, select to “Install the software automatically”. Windows will then search for and install the appropriate drivers, which may take several minutes. Be patient; If you interrupt this process, the setup will fail!

This procedure is repeated for the “USB Serial port”.

Changes made in “PIM Assistant” are only written to the PIM when the **Save** button is clicked. No automatic data synchronization is performed, so **remember to Save before exiting!**

The PIM unit is powered from the USB port while it is connected to a PC.

**Tip!** In order to verify proper installation of a PIM unit, begin by starting “PIM Assistant”, then connect the PIM unit to the PC. The message “PIM device connected...” should now appear right under the menu bar in the “PIM Assistant” program. (Windows notification in the lower right corner is only displayed once, the first time a PIM is connected to the USB port.)

### 4.4. Connecting an empty PIM

#### - New PIM routine

When an empty PIM unit is connected, PIM Assistant starts the “New PIM routine”, consisting of five steps:

- Pump Setup
- Event & Graph Setup
- Service Setup
- Rental Setup
- Save to PIM

#### 4.4.1. Pump Setup

Enter pump **PIM ID**, **Number of phase lead runs through PIM** (see chapter 2, “PIM installation instruction”), **Pump data plate** information and **Password** (if activated). Mandatory fields are shown in red until properly filled in.

The PIM ID is used for naming files and save folder and has to be unique. **Note!** If the PIM ID already exists, the field will be shown in red. This problem is solved by either re-naming the new PIM or by moving/deleting the directory named after the present PIM ID in the **PIM files** directory (default subdirectory **PIMs**). **Number of phase lead runs through PIM** is an important parameter that will affect the scaling of the logged current, as previously discussed. Make sure that the number entered corresponds to the actual physical number of phase lead runs (see chapter 2, “PIM installation instruction”)!

These settings can be edited later by selecting **Optional pump setup** on the orange work flow bar when PIM is connected.

Pump Setup dialog



## PIM Assistant (PC program)

### 4.4.2. Events & Graph Setup

Enter graph axis min. and max. values and alarm levels for current and temperature. Default values are set according to the values entered under “Preferences”

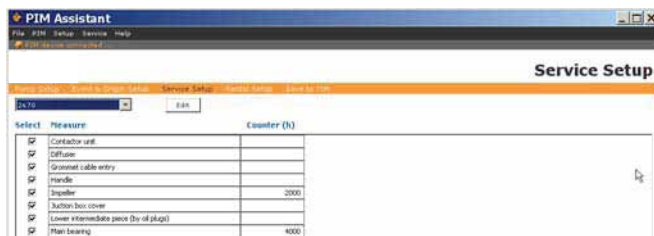


Events & Graph Setup dialog

### 4.4.3. Pump Service Setup (connected to PIM)

This dialog is used for setting up a specific list of service measures and counters for a particular pump, to be used on recurring service occasions. Here you can:

- Select a pump model from the drop-down list.
- Limit the total list of measures by de-selecting those that are not wanted for this pump.
- Add service measures and counters by clicking the Edit button. This will bring up the **General Service Setup** menu (chapter 4.2.2.). By going through the general setup, including **Preferences** and saving, you will end up in the **Pump Service Setup** menu again.



(Pump) Service Setup dialog

### 4.4.4. Rental Setup

Enter customer and application information.

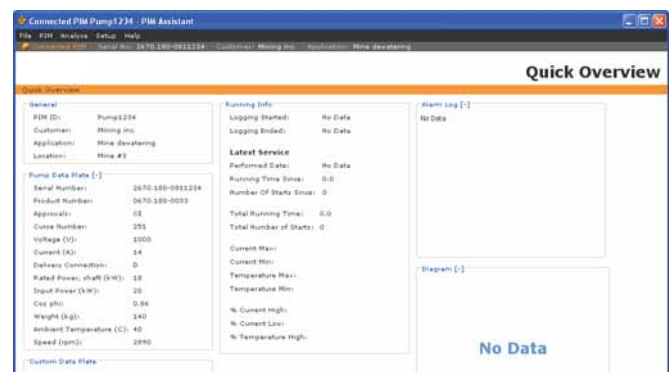


Rental Setup dialog

### 4.4.5. Save to PIM

Check that all information is correct. By default old measurement data will be erased to ensure that the PIM is empty when commissioned. Click Save to save the information to PIM. All mandatory fields must be filled in before saving is enabled.

A confirmation of the successful save is displayed. Click OK in the dialog and the information written to PIM will be read back in the “Quick Overview” dialog to verify that all data was properly written.



Quick Overview dialog.

The PIM unit can now be unplugged from the PC and is ready to start logging.

## 4.5. Connecting a non-empty PIM - Returning PIM routine

When a PIM that has a PIM ID is connected to a PC, “PIM Assistant” will automatically download and save data from the PIM unit. Data files will be saved with today’s date and the PIM name in a sub folder named after the PIM ID (e.g. **C:\Program Files\PIM Assistant\PIM123**).

If the file name exists (e.g. if you download from the same PIM more than once on the same day) you will be prompted to do one of the following:

- **Open another archive and save there** saves the files in a new directory.
- **Save as a new version** saves the files with a consecutive number.
- **Replace files** overwrites the previous files.
- **Cancel** aborts the reading from the PIM.

## PIM Assistant (PC program)

The “Returning PIM routine” consists of four main steps:

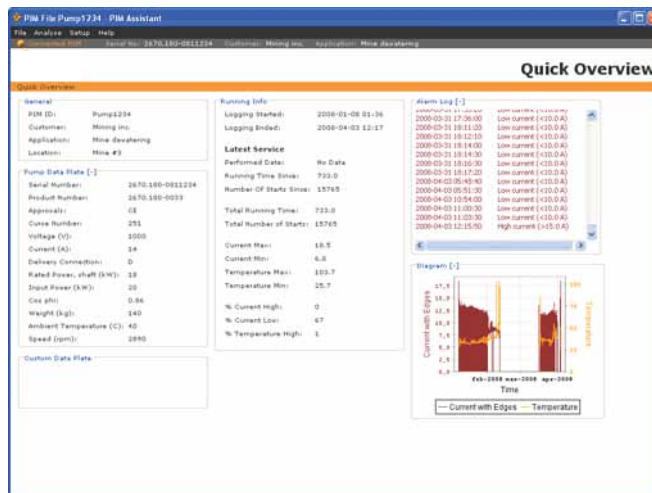
- Quick Overview
- Service Reporting
- Rental Setup
- Save to PIM

In addition to these four steps, it is also possible to study the logged data in graphs, to view the service log (see chapter 4.6, “Analyzing data”) and to edit the data plate and number of phase lead laps (see chapter 4.5.5, “Optional pump setup”)

### 4.5.1. Quick Overview

When a returning PIM is connected, a Quick overview page will display the following data:

- General pump information: PIM ID, Customer, Application and Location
- Pump data plate: Data plate information
- Custom data plate: Possible extra data plate information
- Running info:
  - Logging started. Time of first logged value in data base
  - Logging ended: Time of last logged value in data base
  - Date of latest service
  - Runtime and number of start since latest service
  - Total runtime and number of starts (since PIM was installed)
  - Current and temperature min. and max. values during this logging period
  - Percentage of runtime above/below alarm limits
- Alarm log
- Diagram thumbnail (click to enlarge graph, view other graphs and view service log)



Quick Overview dialog

To view larger graphs and see service history, click the diagram or menu Analyze – Open trend diagram (See chapter 4.6, “Analyzing data”).

Longer texts that may not be displayed in full, will be expanded at mouse-over.

The serial and product numbers can be copied to the clipboard by left-clicking on them. This allows for easy pasting into the Flygt service guide, for example.

The data plate, alarm log, and diagram box can be minimized by clicking the “[–]” symbol. The minimized data plate shows only the mandatory entries (Serial number, Product number, Voltage, Current and Input power).

### 4.5.2. Service Reporting

This section allows for easy service reporting. Click **Service & reporting** on the orange work flow bar to enter the service reporting dialog.

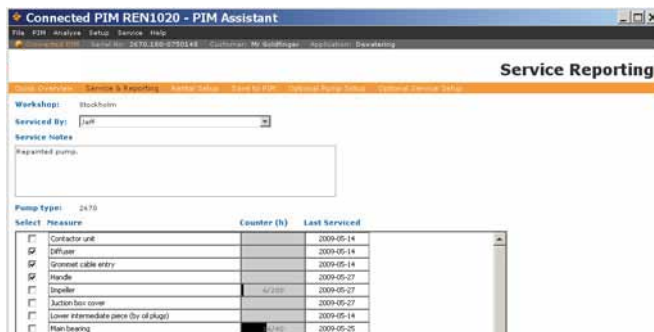
1. Choose service person from the drop-down list. If the intended person is missing from the list, click the menu **Setup – Workshop setup** and enter a new name.
2. Enter free text service notes.
3. Check in the **Select** column the service measures that have been (or will be) carried out.

Entering what service measures are carried out (i.e. which parts are replaced) on each service occasion, facilitates following the service history of the pump. Note that the black bar in the **Counter** field gives a graphical indication of the service interval status for the component: e.g. the Main bearing counter in the example image below has reached 40% of its service interval.

## PIM Assistant (PC program)

To add a service measure to the list:

1. Click **Setup** – Service on the black menu bar, then **Add Measure**. Step through the entire **Setup** flow and **Save**.
2. Click **Optional Setup** on the orange work flow bar and check the service measure.
3. Return to **Service & reporting** to report the new service measure.



Service Reporting dialog

### 4.5.3. Rental Setup

Edit the contents only if any information has changed. If the pump is returning to the same customer and the same site there is no need to change anything here.

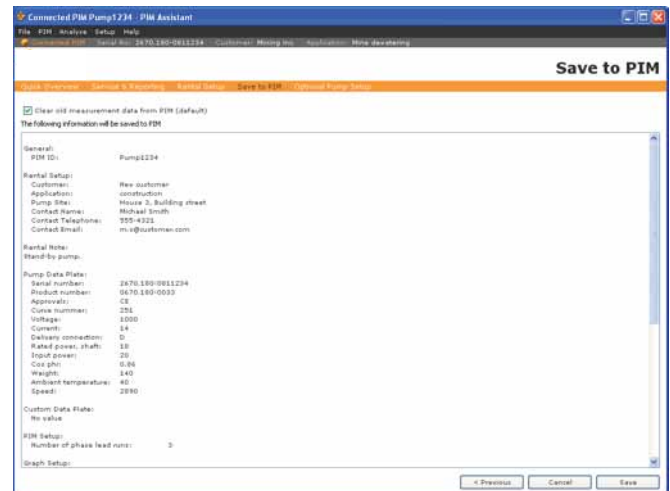


Rental Setup dialog

### 4.5.4. Save to PIM

Make sure that all settings are correct and decide if the previously logged data should be erased. The default setting is to Clear old measurement data from PIM since the data is now already saved on the PC. It is also generally wise to free up the PIM resources to extend the logging capacity (see chapter 3, “Data logging in PIM”).

Note that no data is written to PIM until the **Save** button is clicked.



Save to PIM dialog

### 4.5.5. Optional Pump Setup

Click Optional pump setup on the orange work flow bar to edit the data plate information, PIM ID or the number of phase lead runs through PIM. Don't forget to go back to Save to PIM and click Save in order to save the setting to the PIM unit.

## 4.6. Analyzing Data

When a returning PIM has been connected or when a previously stored data file is loaded (**File – Open file**) the Quick overview page is displayed. By clicking the diagram thumbnail or selecting the menu **Analyze – Open trend diagram**, a new window is opened. In this window it is possible to display logged data in different graphs and to view the Quick Overview, Service Log and Alarm Log.

It is possible to go back to the main window and load a new file; Select **Analyze** and view data from two different files in two different windows at the same time.

Note that loading data while in the “Returning PIM routine” (i.e. having a PIM connected) will abort this routine. It is then possible to reconnect that PIM unit to restart the “Returning PIM routine” and make a service report.

The **Analyze** window consists of four steps:

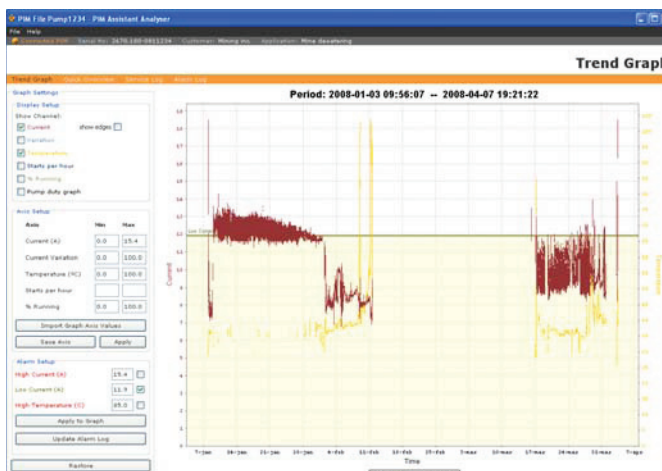
- Trend Graph
- Quick Overview
- Service Log
- Alarm Log

## PIM Assistant (PC program)

### 4.6.1. Trend Graph

**Display Setup** - Choose which channels/graphs to view. All graphs are displayed in the same window, although some graphs are more combinable than others. Right-click the different channels to change the graph colors.

- **Current:** Displays current, logged every 10th second.
- **Show edges:** If checked, the current graph will show the edges going from and to zero. This makes it easier to view data when zoomed in.
- **Variation:** Displays the current variation – a parameter indicating how much the current is varying, logged every 10th second. A high variation could indicate snoring, unbalanced impeller or some other unfavourable running condition.
- **Temperature:** Displays the PIM temperature, logged every minute. This is the internal temperature in the PIM unit which is placed in the pump top, giving a general indication of the pump temperature.
- **Starts per hour:** Displays how many times the pump has started each hour. This gives a snapshot of how regularly the pump is running.
- **% Running:** Displays the percentage running per 24 hours. 100 % means continuous running.
- **Pump duty graph:** Displays the runtime as a colour coded schedule. Gives a snapshot of how much the pump is running over or under the alarm limits.



Trend Graph window

**Axis Setup** - Enter the max. and min. values for the different graph axis.

**Import Graph Axis Values:** sets the values to the present values in the graph.

**Save Axis:** saves the axis values to PIM/file.

**Apply:** applies the set limits to the graph.

**Alarm Setup** - Set, show or hide alarm limits. Right-click the alarm names to change the colours of alarm lines and fields.

The checkbox determines whether to show the alarm limit in the graph or not.

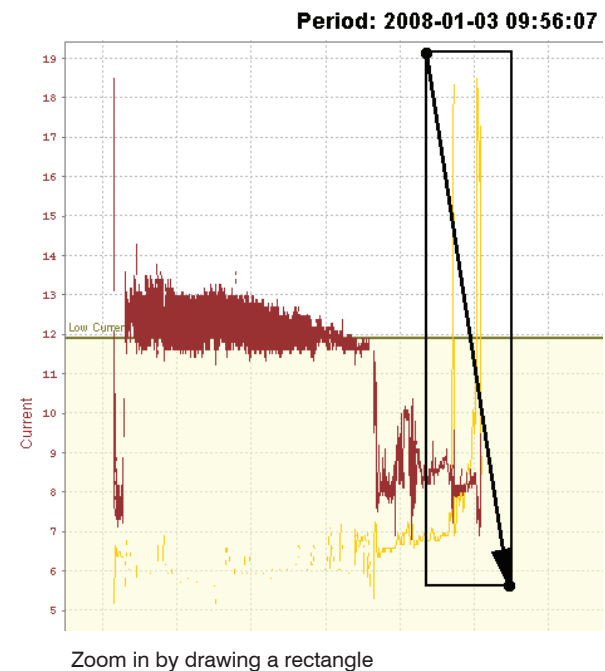
**Apply to Graph:** changes the displayed alarm limits in the graph.

**Update Alarm Log:** recalculates the alarm log with the new alarm limits. It also recalculates the percentage of time the pump has been running over and under the alarm limits, which is shown on the **Quick Overview**.

**Restore:** restores the last saved axis and alarm limit settings.

#### Zooming

To **zoom in**, hold down the left mouse button and draw a box over the area of interest. The box has to be drawn from top left to bottom right. Release the left mouse button to zoom in.

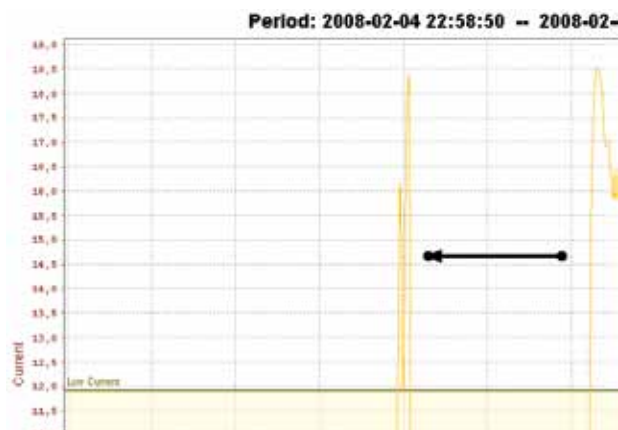


Zoom in by drawing a rectangle

To **go back** one step at the time, simply left-click on the graph.

To **zoom out** all the way, hold down the left mouse button and draw a short line to the left. When releasing the button, the graph will zoom out to show all available data.

## PIM Assistant (PC program)



Zooming out all the way

### Saving and printing a graph

Right-clicking the graph brings up a menu for saving the graph as a PNG image or sending it directly to a printer.

### 4.6.2. Quick Overview

See chapter 4.5.1, Quick Overview.

### 4.6.3. Service Log

This displays the service log where previous service occasions are recorded.

Date	Service done	Parts	Total Running Time(h)	Total Running Time(h)	Starts	Stops
2008-12-15	Workshop Service performed for Customer: PIM unit Application: PIM unit Pump type: PIM unit Pump size: PIM unit Pump age: PIM unit Pump status: PIM unit	PTT Workshop PIM unit PIM unit PIM unit PIM unit PIM unit PIM unit PIM unit	720.0	1670.0	1730.0	1730.0

Service Log dialog

### 4.6.4. Alarm Log

This displays the alarm log.

### 4.7. Loading a file - View data off-line

To view data when a PIM is not connected to the computer, select menu **File – Open file**. Choose a file (.pmp) and click **Open**.

### 4.8. Upgrading firmware

When a PIM is connected, select menu **PIM – Upgrade FIRMWARE** and choose a PIM firmware file (.hex).



*Make sure that the PIM unit is not disconnected during the upgrade, or corruption in the data transfer might render it unusable!*

### 4.9. Restoring a PIM from file

It is possible to make a “copy” of a PIM unit (e.g. if it is broken or missing). Select menu **PIM – Restore from file** and choose a pump-info file (.pmp) to restore from.

To replace a broken or missing PIM, it is recommended to restore from the latest available pump-info file. The PIM will now be loaded with the settings from the selected file (Total runtime, number of starts, service log, data plate, alarm limits, etc.).

Note that data bases will not be written back to a PIM.

### 4.10. Resetting PIM to factory settings

To reset a PIM unit to factory settings, do the following:

1. Connect the PIM unit to the PC.
2. Wait until “PIM Assistant” has read all information from the PIM unit.
3. Select menu **PIM – Reset PIM to factory settings**
4. Disconnect and reconnect the PIM unit to enter the new PIM routine.

Note that all measurement data, log files and information stored in the PIM **will** be deleted.

### 4.11. Viewing software versions

Menu **Help – About** will display the current software version of the “PIM Assistant” and, if a PIM is connected, the current firmware version of the PIM unit as well.



## Appendices

# 5. Appendices

## 5.1. Appendix 1 - File structure

By default the save path of the “PIM Assistant” is “C:\Program Files\PIM Assistant\PIMs”.  
The save path may be edited under menu **Setup – Preferences**.

When a new PIM is set up, a folder is created with the same name as the PIM ID, e.g.

“C:\Program Files\PIM Assistant\PIMs\PIM123” if the PIM is named “PIM123”.

In this folder all files associated with this PIM ID will be saved by default.

Files are named with the date they were created, the PIM ID and the type of the file, e.g.

“080131\_PIM123\_Pumpinfo.pmp”.

The PIM data is divided into five different file types:

- <date>\_<PIM name>\_**Datalog.dta** contains the data log. Current, current variation and temperature with time stamps.
- <date>\_<PIM name>\_**Parameters.par** contains PIM internal parameters. Changing these may cause the PIM to not function properly!
- <date>\_<PIM name>\_**Pumpinfo.pmp** contains configuration settings (PIM name, address, customer, application, alarm limits), data plate info, service log and counters.
- <date>\_<PIM name>\_**Eventlog.evt** contains the event log.
- <date>\_<PIM name>\_**Alarmlog.alr** contains the alarm log.

These five files are created when a returning PIM has been connected.

After doing a service routine and saving to PIM, two special files are created:

- <date>\_**Out**\_<PIM name>\_**Parameters.par**
- <date>\_**Out**\_<PIM name>\_**Pumpinfo.pmp**

These files contain the most recent changes to service log, customer information, application information and so on, but do not have any associated data log, event log or alarm log.

If a filename already exist when reading from a PIM (e.g. if the same PIM unit is connected more than once on the same day) and the option **Save as a new version** is chosen, the file names will acquire a consecutive number and have the following format:

- <date>\_1\_<PIM name>\_**Pumpinfo.pmp**